

## **SITUATION AND LAYOUT FOR HIGHWAY & WATERWAY CROSSINGS**

### **PURPOSE**

The purpose of the Situation and Layout sheets is to provide an accurate overview and orientation of the project. The Engineer, checker, and detailer are responsible to ensure this data is correct.

Once the Situation and Layout is approved, it should not be changed and final design should begin.

### **SITUATION AND LAYOUT**

- Refer to the Bridge Design Manual page B17.4 for plan sheet format data.
- An engineering scale should be used for the sheet.
- The Situation and Layout data shall be the first sheet of the structure plans and shall consist of the following plan sheets.
  - Sheet 1 of the final plans shall contain the following items:
    - PLAN
    - ELEVATION
    - PROFILE DATA
    - HORIZONTAL ALIGNMENT DATA
    - HYDRAULIC DATA
  - Sheet 2 of the final plans shall contain the following items:
    - VICINITY MAP
    - SHEET INDEX
    - QUANTITIES
    - TRAFFIC DATA
  - Sheet 3 of the final plans shall contain the following items:
    - DESIGN NOTES
    - GENERAL NOTES
- The PRELIMINARY Situation and Layout data should include a fourth sheet if necessary showing the following data:
  - Typical section (Could be put on sheet 3 and then removed on final plan preparation)
    - Curb-curb and out-out widths
    - Sidewalk and curb widths
    - Type of railing
    - Slab thickness
    - Slab reinforcement cover for both mats
    - Girder type and spacing
    - Centerline and profile grade point
    - Crown slope
  - Design features
    - Show enough details of design features to clarify the concept. This should include abutment and pier/bent elevations and/or sections.
- The Title Block shall be completed as follows:
  - Sheet Title: SITUATION AND LAYOUT
  - Project Description: The project description shall include the following:
    - Total length of a bridge to the nearest foot and clear span length of a culvert to a tenth of a foot.
    - Type of main supporting member
    - Names of features involved in the crossing
  - Examples:
    - 262' STEEL GIRDER UNDERPASS
    - ROBERTS I.C.
    - I-15 STA 300+77.51 SH-48 STA 29+46.79

256' PRESTRESSED CONCRETE BRIDGE  
E. BRIDGE ST. OVER WEISER RIVER  
STA 8+24.78  
15' CONCRETE BOX CULVERT  
US-95 OVER CALF CREEK  
STA 289+30.00

Bridge Key Number: Obtain the correct number from Bridge Asset Management. Only those structures on the State Highway System with spans greater than or equal to 10' that carry highway traffic or cross a highway require a number. Only those structures on the Local/Off Highway System with spans greater than 20' that carry highway traffic or cross a highway require a number. The number needs to be shown on every sheet.

## **SHEET 1**

### **PLAN VIEW**

- Title the view PLAN and show the scale factor below the title.
- Show the total length of structure (out -out of backwalls) along the survey line.
- Show the abutment/pier number, station, and finished grade elevation at the intersection of the abutment/pier centerline and the survey line at the following locations:
  - Begin/End of structure
  - Centerline bearing of abutments
  - Centerline of piers/bents
- Show the span lengths along survey line as follows:
  - Single Spans or End Spans: abutment centerline bearing - centerline pier/bent
  - Interior Spans: centerline pier/bent - centerline pier/bent
- Show the total bridge width (out - out). The width should include the parapet, curb or sidewalk.
- Show the curb-to-curb width.
- Show the roadway lane and shoulder widths. Verify conformance with the roadway plans.
- Show the lane direction and name of closest town/geographical feature in that direction.
- Show the North arrow.
- Show the intersection angle if not a 90° crossing.
- Show the horizontal and vertical clearances as follows:
  - Highway Crossings: Show the point of minimum vertical and horizontal clearance for the highway.
  - Stream Crossings: Show the point of minimum clearance above Q<sub>50</sub> high water elevation.
- Identify the survey and profile lines. Verify conformance with the roadway plans.
- If the new structure is at or adjacent to an existing bridge, show enough details of the existing bridge to insure that all possible conflicts are taken into account in the layout of the new bridge. As-built plans or field measurements should be used to accurately depict the existing bridge.
- If the existing bridge is to be removed, show the drawing number of the existing bridge plans.
- Orientation of the PLAN view shall allow the ELEVATION view to be a direct projection beneath the PLAN view.
- Stationing for bridges shall be along the centerline of structure and shall advance from left to right on the sheet.
- Stationing for culverts shall be along the centerline of roadway and shall advance from bottom to top of the sheet.
- Show the limits of riprap. If riprap is not included in the structure bid items, add a note referencing the roadway pay items.
- Contour lines, if shown, should not project through the structure limits, dimension lines, or notes. Contour lines should be drawn in gray tones so they will not dominate the PLAN view.
- Show any utilities crossing the structure and show the location of any deck drains.
- Show the location of a Survey Cap at the top of the parapet or curb. The note should read, "A Survey Cap will be furnished by the State and shall be installed by the Contractor".

### **ELEVATION VIEW**

- Title the view ELEVATION and show the scale factor below the title.
- Show the total length between abutment centerlines of bearing along the survey line.
- Show the abutment/pier number and station at the following locations:
  - Centerline bearing of abutments
  - Centerline of piers/bents

- Show the span length.
- Show the span number for multi-span bridges.
- Identify the type of fixity between the substructure and superstructure at the abutments and piers/bents using the following designations:
  - E Expansion
  - P Pinned
  - F Fixed
- Show the minimum vertical clearances as follows:
  - Highway Crossings: Show the minimum vertical clearance for the highway to the nearest tenth of a foot and locate the point.
  - Stream Crossings: Show the minimum clearance above  $Q_{50}$  high water elevation to the nearest tenth of a foot and locate the point.
- Show the natural ground line along the centerline of structure.
- Show the abutment slopes and call out the slope perpendicular to the stream or highway.
- The ELEVATION view should be a projection of the PLAN view. Show the end projection only for the abutments and piers. Showing the actual projection for skewed bridges is confusing.
- Show the roadway approach guardrail and reference the roadway plans for details.

#### PROFILE DATA

- Title the view PROFILE DATA. The view can be drawn "Not to Scale".
- Show the profile grade across the structure.
- Show the location of the structure on the alignment.
- Show the begin/end of bridge station and elevation.
- Show the profile grades for all highways involved in the crossing. Verify conformance with the roadway plans.
- Show the following vertical curve data:
  - Stations and elevations at point of curvature, point of intersection, and point of tangency.
  - Length of vertical curve
  - Incoming and outgoing grades in percent

#### HORIZONTAL ALIGNMENT DATA

- Title: HORIZONTAL ALIGNMENT DATA.
- Show the stations at point of curvature, point of intersection, and point of tangency on the PLAN view if possible. If not possible, list the stations in the curve data. Verify conformance with the roadway plans.
- Show the following horizontal curve data:
  - $\Delta$ , T, L, R, S, RL, and Z.
  - Horizontal curves shall be described by the degree of curve.
- Show the superelevation transition data if applicable. Cross-sections at the control points are recommended.
- If the structure is on a tangent alignment, show the bearing in the PLAN view.

#### HYDRAULIC DATA

- Title: HYDRAULIC DATA
  - Show the following hydraulic data for streams and rivers:

<u>FLOOD</u>	<u>DISCHARGE</u>	<u>H.W. ELEVATION</u>	<u>VELOCITY</u>
Design ( $Q_{50}$ )	cfs	ft	fps
Base ( $Q_{100}$ )	cfs	ft	fps
Scour ( $Q_{sc}$ )	cfs	ft	fps
  - Show the following hydraulic data for canals:

Canal Flow	cfs
H.W. Elevation	ft
Velocity	fps

Flow controlled by \_\_\_\_\_ Canal Company.
  - Hydraulic data is not required for minor structure rehabilitation or extension projects.

## **SHEET 2**

### **VICINITY MAP**

- A map of the State of Idaho showing location of the project.
- A vicinity map showing the location of the bridge site.

### **INDEX OF SHEETS**

- Title: **INDEX OF SHEETS**
- The bridge plans shall be numbered independently from the roadway plans and shall start with sheet 1.

### **QUANTITIES**

- Title: **QUANTITIES**.
- Show all the bid items listed on the cost estimate for the structure except Mobilization.
- The quantities do not need to be shown until the final plans are prepared.

### **TRAFFIC DATA**

Show traffic data for the route that is carried by the bridge.

- Title: **ONE DIRECTIONAL DATA**
- Show AADT(Annual Average Daily traffic – formerly designated ADT) for year of construction and 20 years past construction year.
- Show CAADT(Commercial Annual Average Daily Traffic – formerly designated ADTT) and percent of CAADT for year of construction and 20 years past construction year.

## **SHEET 3**

### **DESIGN & GENERAL NOTES**

The Design Notes shown on page B17.1A – B17.2E of the Bridge LRFD Manual are intended to be used as a checklist for the usual situation and should be modified to fit each individual case.

### **DESIGN PROCEDURES**

Multi-span prestressed girder bridges should include one of the following notes. Refer to Article 5.14.1.4.

- a. Girders designed as simple spans and reinforcement added to resist negative moment.
- b. Girders designed fully continuous for live load.
- c. Girders designed as simple spans; slab reinforcement added to limit cracking.

### **FOOTING & PILE DESIGN LOADS**

- The computed and ultimate values for the Pile/Footing Design Loads should be shown on the final Situation and Layout submittal.
- Values denoted as “X” shall be furnished by the Geotechnical Engineer.
- Values denoted as “xx” shall be furnished by the Bridge designer.

### **CONSTRUCTION**

- Projects involving rehabilitation or repair should add the following note: “The contractor shall verify dimensions in the field before ordering material.”

**Revisions:**

June 2006	Article was renumbered to 17.2 to allow for addition of new Article 17.1.  Deleted Traffic Data from Situation Layout requirements. Single lane ADTT was added to the Transient Loads on the Design & General Notes sheet.
April 2008	Added paragraph for Vicinity Map, Index, & Quantities Sheet.
July 2009	Revised "Index of Sheets" to "Sheet Index" on page 1.
March 2011	Changed location of stationing for culverts from "centerline of structure" to "centerline of roadway". Added traffic data to sheet 2 to provide one directional data required for load rating. Added Pile//Footing Design Load data and deleted Article A17.2
Feb 2012	Changed the name of "Bridge Inspection Master Key" to "Bridge Key Number". Added clarification when the Bridge Key Number is needed. Required the bridge Key Number be shown on every sheet.
June 2013	Added "Verify conformance with the roadway plans" for lane & shoulder widths, survey & profile lines, profile grades, and horizontal alignment data.
May 2014	Revised notations of ADT & ADTT to AADT & CAADT to agree with notations used by the Planning Section.